

Impact of Nutrition Education on the Food and Nutrient Adequacy of Smokers

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ABSTRACT Seventy five male smokers in the age group of 25-40 years with similar smoking habits and physical activity pattern were selected from Ludhiana to study the impact of nutrition education on food and nutrient adequacy of the smokers. After assessing the basic knowledge of the subjects about the disease and its consequences and role of antioxidants by knowledge testing questionnaire, the subjects were imparted nutrition education regarding the importance of antioxidants, sources of antioxidants and amounts required to combat different diseases. Information was given in the form of booklet followed by brief verbal counselling regarding the contents of the booklet for three months. At the end of the study, the same questionnaire was used to assess food and nutrient adequacy of the subjects after nutrition education. It was observed that intake of green leafy vegetables and fruits was increased whereas consumption of mutton, meat and egg reduced significantly ($P \leq 0.05$) after nutrition education. The consumption of carbohydrate decreased significantly whereas total and visible fat decreased marginally, after nutrition education. Also there was positive energy balance among smokers after nutrition education. Among vitamins and minerals, vitamin E intake increased significantly after NE and subjects preferred to consume vitamin E capsule rather than antioxidant rich diet. Thus nutrition education imparted to the smokers was helpful in changing the dietary pattern of the smokers.

INTRODUCTION

Smoking is a uniquely common habit and has been identified as a major risk factor for coronary heart disease (CHD) and number of other diseases. In India about 53 per cent of adult males and 3 per cent of adult female smoke. The dietary habits of smokers and non smokers are seen to be considerably different. The daily energy, fat and carbohydrate intake is found to be higher in smokers than among non smokers (Cade and Barrie 1990) Smokers are said to have a lower intake of poly unsaturated fatty acids (PUFA) and dietary fibre than among the non smokers. Smokers are believed to have a higher intake of sucrose and lower intake of vegetables, dairy products and cheese (Nuttens et al., 1992). Smokers are believed to have a poor consumption of fresh fruits and green leafy vegetables. In earlier study carried out, it was observed that the consumption of green leafy vegetables was very poor among smokers (65 g/day) as compared to non smokers (90 g/day). The vitamin A intake was much lower among smokers than non smokers (50g and 60 g/day respectively). The vitamin C intake was within the normal range for smokers and non smokers but it was observed that inspite of an adequate

intake, the serum ascorbate levels were very low for smokers as compared to non smokers. Thus smokers were found to be higher level of total cholesterol, low density lipoprotein cholesterol and very low density lipoprotein cholesterol (Randhawa, 1997).

Smokers consumed more of saturated fat and non vegetarian foods which is the root cause of various health problems. Smokers were also found to be generally less healthy than their non smoker counter parts (Randhawa, 1997). Thus with the hypothesis that dietary antioxidants may help to prevent the development of atherosclerosis and associated problems among smokers, the present study has been planned to study the impact of nutrition education on the food and nutrient adequacy of the smokers.

MATERIAL AND METHODS

Selection of Subjects: A group of 75 smokers aged 25-40 years, belonging to upper middle socio-economic group, having similar physical activity pattern and smoking habits were selected purposively from Ludhiana city for the study.

Development of Questionnaire: A questionnaire was developed to obtain the general information, smoking habits, dietary pattern and dietary intake for 3 consecutive days.

Nutrition Education: Nutrition education

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was imparted to the subjects to motivate them to consume antioxidant rich foods. A small introduction about the antioxidants, their importance for smokers and objectives of the present study was presented to the subjects in the form of booklets or manuals prepared with all the information about the antioxidants and their uses, sources of antioxidants and amounts required to combat different diseases. The distribution of booklets was done in batches. In each batch, 10 to 15 smokers were provided with reading material. It was followed by a brief verbal counselling regarding the contents of the manual. Smokers were encouraged to read the material within a period of 15 days. A contact with the subjects was maintained fortnightly for three months. At the end, the smokers were administered the same questionnaire and their diet of three consecutive days was recorded again to study the effect of nutrition education.

Food and Nutrient Analysis: The dietary survey was done to determine the nutrient intake level, sources of nutrients and food habits of the subjects by 24 hour recall method for 3 consecutive days. The dietary intake was recorded before supplementation and after one month supplementation period. The different food items consumed were converted into their raw equivalents, categorised into their respective food groups and average daily intakes of protein, fat, fibre, carbohydrates, energy, iron, calcium, and vitamins were calculated from the values per 100g of edible portion by using MSU nutriguide (Song et al., 1992). The dietary intake for 3 days was also collected after nutrition education for smokers.

Statistical Analysis: The data obtained on food and nutrient intake was then analysed statistically. The mean, standard error, analysis of variance, t-value and their test of significance was calculated using a computer package programme – CPC-SI and CSII of Cheema and Singh (1990).

RESULTS AND DISCUSSION

Table 1 presents the general information of smokers in the age group of 25-40 years. Among the smokers, maximum number of smokers were graduates (37) and (52) were married. All the subjects were Hindus by caste. As for the family size, 53 smokers had a family of 1-4 members and 22 smokers had a family of 5-7 members.

Out of 75 smokers respondents, 34 were doctors by profession, 28 were businessman and 13 belonged to service class.

Smoking habits of the subjects are given in Table 2. Eighty nine per cent of the smokers were continuous smokers whereas twenty seven smokers smoked in order to enjoy the company of friends. Twenty smokers smoked as a status symbol. Fifteen smokers smoked to relieve mental stress and 13 smokers smoked cigarette to increase physical strength. Sixty nine smokers smoked filter cigarettes only and 54 smokers smoked more than 10 cigarettes in a day and 21 smokers smoked less than 10 cigarettes in a day. It was observed that smokers did not smoke cigarettes without anything to eat or drink. Fifty smokers drank tea with cigarettes or *vice versa*. Twelve smokers enjoyed a course of hard drinks and nine enjoyed fried foods whereas four smokers did not take anything along with a cigarette.

Dietary habits of smokers before and after nutrition education is presented in Table 3. The effect of nutrition education was clearly visible as there was a slight change in the dietary habits of smokers. There was an increase in the number of smokers who turned vegetarian (23) after nutrition education. Lesser number of smokers (12) as compared to before (21) consumed mutton which has more fat and cholesterol in it.

Table 1: General information of smokers in the age group of 25-40 years.

Particulars	Smokers (N=75)	
	No.	%
Education		
Undergraduate	16	21.3
Graduate	37	49.3
Post Graduate	22	29.3
Caste		
Hindu	75	100
Sikh	-	-
Marital Status		
Unmarried	19	25.0
Married	52	69.3
Widower	3	4.0
Divorcee	1	1.7
Family Size		
1-4 members	53	70.7
5-7 members	22	29.3
Occupation		
Business	28	37.3
Medicos	34	45.3
Service	13	17.3

% = percentage

Table 2: Smoking habits of smokers before and after nutrition education.

Particulars	Before nutrition education (N=75)		After nutrition education (N=75)	
	No.	%	No.	%
Continuous smokers	67	89.3	53	70.7
Smoke in order to:				
Increase physical strength	13	17.3	6	8.0
Enjoy company of friends	27	36.0	20	26.7
Achieve a status symbol	20	26.7	25	33.3
Relieve mental stress	15	20.0	24	32.0
Smoke only filter cigarettes	69	92.0	73	97.3
Smoke 10 cigarettes per day	54	72.0	32	42.7
Smoke less than 10 cigarettes per day	21	28.0	43	57.3
Alongwith cigarettes they take:				
Tea	50	66.7	40	53.3
Hard drinks	12	16.0	9	12.0
Fried foods	09	12.0	6	8.0
Nothing	04	5.3	20	26.7

% = percentage

More number of smokers (73) as compared to earlier number (21) started consuming green leafy vegetables. Also the number of smokers consuming fruits increased from 22 to 73. Veechia et al. (1992) also reported the lower consumption of fresh/fruits and green leafy vegetables.

Average daily food intake of smokers before and after nutrition education is given in Table 4. There was a significant ($P \leq 0.05$) decrease in the consumption of roots and tubers from 93.49 ± 1.61 g/day to 70.05 ± 1.68 g/day after nutrition education. Fruit consumption also increased significantly ($P \leq 0.05$) from 182.34 ± 8.93 g/day to 193.36 ± 8.91 g/day after nutrition education. The consumption of meat and egg was 42.91 ± 2.03 g/day and decreased significantly ($P \leq 0.05$) after nutrition education to 39.15 ± 2.04 g/day. There was a marginal decrease in the fat and oil, sugar and jaggery consumption.

Daily average nutrient intake of smokers before and after nutrition education is given in

Table 3: Dietary habits of smokers before and after nutrition education.

Particulars	Before nutrition education (N=75)		After nutrition education (N=75)	
	No.	%	No.	%
Vegetarian	21	28.0	23	32.0
Non vegetarian	49	65.3	45	60.0
Ova-vegetarian	5	6.7	07	8.0
Consume Non-vegetarian Food:				
Daily	3	6.1	1	2.0
Alternate days	9	18.4	7	14.3
Once a week	27	55.1	30	61.2
Rarely	10	20.4	11	22.4
Eat mostly				
Chicken	28	57.1	30	61.2
Mutton	21	42.8	12	24.5
Fish	-	-	7	14.3
Beef	-	-	-	-
Consume Green Leafy Vegetable:				
Daily	21	28.0	73	97.3
On alternate days	03	4.0	-	-
Twice a week	13	17.3	02	2.7
Rarely	38	50.6	-	-
Consume fruits				
Daily	22	29.3	73	97.3
Rarely	53	70.7	02	2.7

% = percentage

Table 4: Average food intake of smokers before and after nutrition education.

Food groups (g/day)	Before nutrition education (N=75)	After nutrition education (N=75)	Suggested intakes ¹	t-value
Cereals	437.12 $\pm$ 30.39	440.91 $\pm$ 30.51	420	0.05
Pulses and legumes	50.17 $\pm$ 0.65	55.83 $\pm$ 0.65	60	1.12
Green Leafy Vegetables	91.22 $\pm$ 21.52	96.09 $\pm$ 21.61	100	0.25
Other vegetables	67.39 $\pm$ 5.10	69.73 $\pm$ 5.21	100	0.92
Roots and tubers	93.49 $\pm$ 1.61	70.05 $\pm$ 1.68	200	11.23*
Fruits	182.34 $\pm$ 8.93	193.36 $\pm$ 8.91	100	2.60*
Milk and milk products	245.75 $\pm$ 1.13	249.17 $\pm$ 1.14	300	0.35
Meat and eggs	42.91 $\pm$ 2.03	39.15 $\pm$ 2.04	30	2.01
Fats and oils	41.88 $\pm$ 6.66	39.40 $\pm$ 6.61	20	1.21
Sugar and Jaggery	37.33 $\pm$ 3.03	34.11 $\pm$ 3.04	25	0.24

Values are mean $\pm$ SE

*Significant at $P \leq 0.05$

¹ ICMR (1999)

Table 5: Daily average nutrient take of smokers before and after nutrition education.

Nutrients (per day)	Before nutrition education (N=75)	After nutrition education (N=75)	RDA ¹	t-value
Energy (Kcals)	2549.33±69.72	2338.75±69.37	2425	13.72*
Protein (g)	67.11±2.34	65.61±2.22	60	0.21
Carbohydrates (g)	396±5.97	371.02±5.99	-	11.71*
Total fat (g)	48.13±0.45	45.48±0.48	40	0.72
Visible fat (g)	29.22±0.59	22.20±0.48	20	0.41
Fibre (g)	7.21±0.42	7.53±0.44	4.0-6.0	0.01

Values are mean ± SE CD = Critical difference *Significant at $P \leq 0.05$ ¹ ICMR (1999)

Table 5. The energy intake of smokers was 2549.33±69.72 Kcal/day and decrease significantly ($P \leq 0.05$) to 2338.75±69.37 Kcal/day after nutrition education. Carbohydrate consumption decreased significantly ($P \leq 0.05$) from 396±5.97 g/day to 371.02±5.99 g/day after nutrition education. Total and visible fat consumption also decreased marginally. Strain et al. (1990) observed that smokers consumed more fat, non vegetarian food and less of fibre and green leafy vegetables. Kawachi et al. (1993) also concluded that nutrition education was effective in reducing the fat and intake of adult males.

Table 6 presents the per cent calorie contribution of proximate principles in smokers before

Table 6: Percent calorie contribution of proximate principles in smokers before and after nutrition education.

Proximate principles	Before nutrition education (N=75)	After nutrition education (N=75)	RDA ¹
Carbohydrate	73.21	65.84	55-65%
Protein	29.20	16.71	10-15%
Fat	49.22	26.52	15-20%

Values are mean ± SE Ghafoorunissa (2000)

Table 7: Energy balance of smokers before and after nutrition education.

Variable	Before nutrition education (N=75)	After nutrition education (N=75)
Energy expenditure	2262±63.20	2278±60.10
Energy intake	2762.5±71.1	2338.75±69.72
Energy balance	500.5±13.74	60.7±12.74

Values are mean ± SE

and after nutrition education. It was observed that maximum calorie contribution in the diet of smoker before supplementation was from carbohydrates (73%) and fat (49.2%) and this decreased to 65.8 per cent from carbohydrates and 26.5 per cent from fats after nutrition education. Also there was a positive energy balance among smokers and this balance decreased but still remained positive after nutrition education (60.7±12.74 Kcal/day (Table 7).

Average daily vitamin and mineral intake of smokers before and after nutrition education is given in Table 8. Among vitamins and minerals vitamin E intake increased significantly after nutrition education because of convenience of taking vitamin E capsules and therefore vitamin E intake increased from 224.90±0.17 µg/day to

Table 8 : Average daily vitamin and mineral intake of smokers before and after nutrition education.

Nutrients (per day)	Before nutrition education (N=75)	After nutrition education (N=75)	RDA ¹	t-value
Vitamins				
Vitamin A (β-carotene), µg	2594.22±132.63	2445.92±133.07	2400	0.16
Thiamine (B ₁), mg	1.26±0.16	1.26±0.16	1.2	0.31
Riboflavin (B ₂), mg	1.42±0.11	1.43±0.17	1.4	0.72
Niacin (B ₃), mg	17.90±2.25	17.93±2.21	16.0	1.36
Folic acid, µg	85.87±9.78	89.19±9.51	100	1.72
Vitamin C, mg	57.22±3.98	57.38±3.56	40	0.12
Vitamin E, mg	224.90±0.17	231.94±0.14	10 ²	1.62**
Minerals				
Calcium	404.84±8.50	408.28±8.44	400	0.36
Phosphorus, mg	415.55±21.2	417.72±21.01	400	1.24
Iron, mg	37.41±0.60	37.42±0.58	28	0.91

Values are mean ± SE

*Significant at $P \leq 0.05$

¹ICMR (1999)

²ICMR (1997)

231.94±0.14 µg/day after nutrition education. It was also observed that smokers preferred to consume vitamin E capsule everyday rather than consuming an antioxidant rich diet daily. This nutrition education lead to an increase in the vitamin and mineral intake of smokers but the increase was not found to be significantly different.

CONCLUSION

It can be concluded that nutrition education imparted to smokers was helpful in changing the dietary habits of smokers marginally.

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